

Application No. 10/736,475

Amendments to the Specification:

Please amend the Abstract and paragraphs 5, 6, 8, 10, 12, 13, 14, 17, 19, 32 and 38 as indicated below.

Abstract

An Airbag ~~airbag~~ module ~~is~~ in particular disposed in the vehicle seat as an anti-submarining airbag module that includes ~~comprising~~ an inflator, or a connection therefor, a tubular airbag, the two free ends of which are folded over at least once transversely relative to the longitudinal direction of the airbag to form loops, and wherein ~~introducible~~ inserted into the loops of the airbag is a clamping member, by means of which the two layers of the folded-over parts of the airbag are brought into contact, to seal the airbag at least partially in a gastight manner.

[0005] There is provided in accordance with the present invention an airbag module, in particular an airbag module disposed in a vehicle seat as an anti-submarining airbag module. The airbag module comprises an inflator or a connection therefor, and a tubular airbag, the two free ends of which are flattened and folded over at least once closing each end transversely relative to the longitudinal extent of the airbag to form loops. Passing through each of the loops of the airbag is a clamping member, by means of which the two layers of the folded-over parts of the airbag are brought into contact with one another to seal the airbag at least partially in a gastight manner. In the present case, the tubular airbag is advantageously folded over at its free ends in such a way that the airbag in the region of the folded-over and/or bent-over parts in cross section forms substantially two superimposed layers. The inflator, provided it is disposed in the airbag, is advantageously not used for sealing but may be

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accommodated in any desired manner in the airbag. Should the inflator be disposed outside of the airbag, then a connection in the form of a flange is formed in the airbag module and/or in the airbag.

[0006] The two flattened free ends of the tubular airbag may also advantageously be folded over a plurality of times transversely relative to the longitudinal direction of the airbag to achieve an increased gastightness of the airbag. This allows the airbag to be inflated at an even higher pressure. By bringing the two layers of the folded-over parts of the airbag into contact by with the clamping member, the gas tightness of the tubular airbag is advantageously achieved in a constructionally very simple manner and reliable manner. In addition, the manufacturing and assembly costs are reduced. Forming the loops with the airbag makes it easier to dispose the clamping member on the airbag.

[0008] In the deployed state, the airbag advantageously presses against the clamping member so that the two layers of the airbag in the region of the folded-over parts are pressed to a greater extent against one another. In this case, the airbag in the deployed state is self-sealing. The internal pressure of the inflated region of the airbag presses against the clamping member, which then in turn presses the two layers of the airbag in the region of the flattened folded-over parts to a greater extent against one another, thereby advantageously increasing gas tightness. An operationally reliable and dependable airbag module is therefore provided.

[0010] The clamping member advantageously extends at the at least one side of the airbag beyond the airbag. In said case, the clamping member is pushed transversely to the longitudinal direction of the airbag through the loops thereof and therefore projects at the at least one longitudinal side of the airbag beyond the airbag. Consequently, the airbag module may advantageously be fastened more easily to a frame part of a vehicle, with the result that the assembly costs may be reduced.

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[0012] The clamping member at the at least one end is advantageously designed in the shape of a hook for engagement with the frame part. This makes it possible to achieve simplified assembly of the airbag module, since the hook-shaped end of the clamping member is introduced at right angles to an opening in the frame part into said opening and then the clamping member is tilted in relation to the frame part towards said frame part so that the hook-shaped end of the clamping member is in engagement with the frame part. The end of the clamping member opposite to the hook-shaped end is then connected by a suitable means for fastening, for example a screw, to the frame part.

[0013] It is further preferred that the clamping member at the at least one end has a swivel device, which is connected to the frame part so as to be capable of swiveling and/or tilting relative to the frame part. Swiveling the clamping member advantageously allows the clamping member to be brought into a position, in which it is particularly easy to introduce the clamping member into the loops of the airbag. The clamping member plus airbag may then be swiveled in the direction of the frame part and braced therewith, so that the two layers of the airbag in the region of the folded-over parts are clamped in between the frame part and the clamping member and consequently pressed against one another. Thus, in an advantageous manner, an increased gas tightness of the tubular airbag is achieved and assembly is simplified.

[0014] In a further preferred embodiment the ends of the folded-over parts of the tubular airbag are connected by a suitable fixing means, for example stitching, gluing or welding, to the airbag. By said means, simplified installation of the airbag module and safe transportation of the tubular airbag may advantageously be guaranteed, since contamination of the interior of the tubular airbag by foreign bodies or substances is prevented.

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[0017] According to the invention an airbag for an airbag module is provided, wherein the airbag is formed from a portion of a seamless continuous tube and/or tube of meter goods, the free ends of which, to form loops, are flattened and folded over at least once closing each free end transversely relative to its longitudinal direction and fixed and/or stitched and/or stapled to a part of the airbag. It is advantageously possible in said case to use a cut-to-length piece of commercially available tubular meter goods as a (continuous) tube. Thus, for example, a piece of a fire hose in general use would also fulfil this purpose. By virtue of the use of a commercially available tube of meter goods it is therefore advantageously possible to reduce the cost of producing the airbag and, because there is no seam, provide an operationally reliable airbag, since there is no danger of a seam bursting. By forming loops at the free ends of the airbag a simplified assembly of the airbag is guaranteed because suitable clamping members may be introduced into said loops.

[0019] According to the invention the method of fastening an airbag to a frame part comprises the following steps: provision of a tubular airbag and a clamping member; flattening and folding-over of the free ends of the airbag at least once closing each free end transversely relative to the longitudinal direction to form flattened loops in the end regions of the airbag; arrangement of the airbag in the region of the folded-over parts so that said parts in cross section form substantially two superimposed layers; introduction of the clamping member into the loops of the airbag and bringing the two layers of the airbag in the region of the folded-over parts into contact by means of the clamping member. By flattening and folding over the free ends of the airbag to form loops, the clamping members are advantageously easily ~~introducible~~ inserted into said loops to bring the two layers of the airbag in the region of the folded-over parts into contact, so that they are advantageously sealed in a gastight manner.

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[0032] Figs. 1 to 4 show a first embodiment of an airbag module according to the invention. The airbag module comprises an airbag 2, which substantially has the form of a portion of a continuous tube, which in the inflated state has a substantially tubular cross section. The tubular walls of the airbag 2 at least at its two open ends, i.e. its end faces, are flattened and pressed together so as to produce a type of band-shaped closed end portion, i.e. two superimposed flattened and pressed together layers 4. The two free closed ends 8 of the airbag 2 are folded over at least once towards the middle of the airbag so as to produce in both end regions of the airbag a loop 6, which extends transversely relative to the longitudinal direction of the airbag 2. By a suitable fixing means 10, preferably a seam, the free ends 8 of the airbag 2 are connected to a main portion of the airbag.

[0038] There now follows a description of the method of fastening the airbag 2 to the frame part 24. By flattening and folding over the free ends 8 of the airbag 2, a loop 6 is formed in each of the two closed end regions of the airbag 2. Clamping members 20, in the form of a rod, are inserted into the loops 6. To simplify insertion of the clamping members 20, the loops 6 are held in shape by connecting the flattened free ends 8 of the folded-over parts of the airbag 2 by suitable fixing means 10, for example stitching or welding, to the airbag 2. Once the clamping members 20 have been introduced into the loops 6, the two layers 4 of the folded-over parts of the airbag 2 are brought into contact, i.e. pressed against one another, by connecting the clamping members 20 to the frame part 24 by means for fastening 22, for example screws. Thus, the airbag 2 is sealed in a gastight manner relative to the environment.